

Why We Remember and Why We Forget: Educational Applications of Memory Research

Psychology 98Tb Course Syllabus

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Have you ever asked yourself any of the following questions?

1. Will I do better on a midterm if I study for a few hours each week or if I cram the night before the exam? What study schedule is best for long-term retention?
2. Quizzing myself (by using flashcards, for example) is only beneficial in that it helps me to figure out what I know and don't know, right?
3. What can I do to improve my memory?
4. Do I have correct theories about how my memory works? Do I study as effectively as I should?
5. Is forgetting ever beneficial?

In this course, you will discover the answers to these questions as well as many others. Examining classic and current research in the field, you will gain an understanding of what memory researchers know about how memory works, specifically as it pertains to principles of learning. Traditional lectures and discussions, readings (e.g., from journal articles and a textbook), peer presentations, as well as the use of media and in-class experiments will comprise the learning experience. This seminar is geared for highly motivated undergraduates with an interest in understanding how human memory works and how this knowledge can provide insights into learning and teaching more effectively.

In this class, my goals are that you will:

1. Gain an understanding of prominent theories and robust effects in human memory research, as they pertain to educational application.
2. Gain an understanding of methods used and results obtained from empirical research on human memory by reading research articles and participating in in-class experiments.
3. Gain tools (strategies) to improve your own studying practices.
4. Improve critical thinking and reading skills, specifically in the domain of cognitive psychology
5. Improve your writing skills via a proposed-research paper assignment that will be given both peer and teacher feedback.
6. Learn better how to think like a scientist—to develop informed hypotheses and design ways to test these predictions.

Attendance and Participation:

Because this is a seminar, class discussions are an important part of the educational experience. As such, both class attendance and participation are essential. You are not only encouraged, but required to participate in class discussions. Also, you are required to visit me outside of class twice during the quarter, at least once to discuss your paper. You may come to regular office hours or make an appointment. Both in-class and out-of-class components will contribute to your grade. Participation will be worth 10% of your final grade.

Assignments:

Discussion Board: Each week, you will be required to make one post on the discussion board. The post should be an answer to one of 2-3 questions that I will ask you for that week. Posts should be the length of a short paragraph (e.g., 3-5 sentences) and should be posted by 3PM the day before each class period. Posts will be graded (i.e., satisfactory: 80% or very good: 100%). Discussion board participation will be worth 15% of your final grade. Late posts will be accepted, but will only receive partial credit (i.e., satisfactory: 60% or very good: 80%). You should email me if you submit a late post.

Paper:

At the end of the term, you should submit a paper that includes a substantive literature review and two proposed experiments with expected results (15-20 pages, including references and title page) similar in nature to the empirical articles that we will read for the course. The goal of the paper will be for you to learn how to think like a scientist: to explore a concept discussed in class, develop a hypothesis, and design two experiments to test that hypothesis. The papers can be about any topic explored in class. You must use at least one reading from the course (including optional readings) and at least four additional readings from outside of the course.

During Week 6, you will turn in an outline and present your paper topic to the class. During Week 8, you should submit a draft of your paper (with literature review and one proposed experiment) to be critiqued by a student in class. I will read the papers, critique them, and return them to you in Week 9. Based upon the critiques, you should revise your paper, and design a second experiment that would answer a question that the first experiment could not answer (making the assumption that the hypothesized results actually occurred). This two-tiered paper will give you the opportunity both to conceptualize your ideas more fully and to improve your writing. The outline will be worth 5%, the first draft worth 20%, and the final paper worth 35% of your final grade. The outline, draft, and final paper should be submitted both in hard copy (two hard copies of the outline and first draft) and in electronic form on turnitin.com.

Class Presentation/Quizzes: Individually or in small groups (2-3 students), you will present on one topic during the quarter. You have three options for the presentation component of the class:

- 1) You may present on an article that is relevant to the day's topic. I will give you a list

of suggested articles; however, you may choose another article if desired. You must choose the article one week prior to the presentation. You should create a power-point presentation for the class, in order to present the background, methods, results, and a discussion of the paper. You should explain how this paper related to the work that you read for class. The presentation should last 15-20 minutes.

2) You can help me to design an in-class experiment, run the experiment, and then present the results the following class period. For a given topic, you will need to be ready to run that experiment during class the week prior. You will help analyze the results and will present the results to the class.

3) You may design some other activity that is relevant to the day's topic. You should see me about possibilities.

These presentations will start during Week 3. You will sign up for a presentation topic during Week 1 or Week 2.

In addition to your presentation, you will also construct a short quiz (6 multiple-choice questions about the weekly articles), to be taken by all of the students in the class. This quiz should be emailed to me 24 hours before class. I will add additional questions and/or revise your questions. The quizzes are intended to stimulate discussion and encourage thorough reading of the articles. The class presentation/quiz will be worth 10% of your final grade. Your scores on the quizzes will be worth 10% of your final grade.

Class Grading Summary:

Class (and office hour) Participation: 10%

Discussion Board Participation: 10%

Outline: 5%

Paper-First Draft: 20%

Paper-Final Draft: 35 %

Class Presentation: 10%

Quizzes: 10%

Policies:

Late or missed assignments: Due dates for each assignment are listed in the schedule. The outline and rough draft of your final paper are due at the beginning of class. The final paper is due by 5PM on the Friday of 10th week. With the exception of discussion board comments (penalties aforementioned), late assignments will be penalized one third of a letter grade (about 4%) for each day late. No participation points (i.e., class participation or class presentation) may be made up due to an absence, except in specific cases (e.g., serious illness). If serious unforeseen circumstances arise that impair your ability to finish assignments on time, please see me as soon as possible so that I can accommodate you.

Academic Dishonesty and Plagiarism: Plagiarism is cheating and plagiarism is lying

to your instructor. A student caught plagiarizing will be reported to the Dean of Students for disciplinary action. Regulation A-306 (C)

Special Needs: If you have a disability or another special need, notify me and the Office of Student Disabilities (OSD; <http://www.osd.ucla.edu>). I will do my best to accommodate you.

Required Texts:

Baddeley, A. D. (1999). Essentials of Human Memory: East Sussex, UK: Psychology Press Ltd.

Course Reader (available for purchase at the ASUCLA bookstore in Ackerman)

A note on the readings: Many of these readings come from scientific journals. As a consequence, they will likely contain some terms and statistical information that you will not understand. Don't worry. What I want you to gain from the articles are the researcher's hypotheses and results as well as an understanding of how the researchers designed the experiments. Several of the articles are cited in the book that we will be using, and you will typically have only two to three articles to read per week.

Schedule:

Week/Topic/Questions to Consider	Articles	Textbook	Paper timeline	In Class
1: The Scientific Study of Memory - How is information stored and recalled? How do psychologists study memory?		Ch. 1		Introductions: name game Introductory Discussion - What is memory, getting the most out of class Syllabus & Overview Experiments & Surveys Assignment of student presentations
2: Working Memory - Are there different types of memory? What is short-term	Logie, Zucco, & Baddeley (1990); Baddeley	Ch. 2 & 3		Quiz/experiment results/discuss readings Skill Development: What is an experiment? Understanding a

memory? Is short-term memory the same as working memory? To what extent, is working memory related to verbal fluency, intelligence, and other cognitive abilities? Why can I sometimes complete multiple tasks at once, but sometimes cannot?

(2000);
Daneman &
Carpenter
(1980)

research article
Experiment

3: Interference & Forgetting - Why do I forget what I read in one section of my history book when I read another section of my history book afterwards? Do certain circumstances make it more likely that I will forget information? Are there different reasons for forgetting? Why do my friends sometimes remember events differently than I do?

McGeoch
(1932);
Underwood
& Postman
& Alper
(1946);
Ekstrand
(1966);
Schacter
(1999)

Ch. 6

Quiz/experiment
results/discuss
readings
Student Presentation?
Skill Development:
What is an experiment?
Understanding methods
and results
Experiment

4: Spacing Study - Should I study throughout the quarter or cram for my exam? When

Bjork &
Allen (1970);
Cuddy &
Jacoby
(1982);

Ch. 4
(pp. 71-
76)

Quiz/experiment
results/discuss
readings
Student Presentation?
Skill Development:

might different strategies be more or less effective? Why?

Kornell & Bjork (2008)

Placing an idea in context/start brainstorming paper ideas
Experiment

5: Retrieval as a Memory Modifier: Testing Effects - Why do I read and re-read my textbook, but still perform poorly on an exam? Does anything happen to my memories when I recall information that does not happen when I re-read my notes? What benefits can tests provide?

Bjork (1988);
Roediger & Karpicke (2006);
Richland, Kornell, & Kao (2009)
Ch. 9 (pp. 169-174)

Quiz/experiment results/discuss readings
Student Presentation?
Skill Development: Library skills & finding sources
Experiment

6: Retrieval as a Memory Modifier: Retrieval-Induced Forgetting and Facilitation - Does the retrieval of some information help or hurt my ability to remember other related information?

Anderson, Bjork, and Bjork (1994);
Macrae & MacLeod (1999);
Chan, McDermott, & Roediger (2006)
Ch. 15 (pp. 312-315)

Outline
Due Quiz/experiment results/discuss readings
Student Presentation?
Review Outlines
Skill Development: Writing a scientific paper (esp. methods section)
Experiment

7. Retrieval as a Memory Modifier: Using Multiple-Choice Tests - Can incorrect information

Marsh, Roediger, Bjork, & Bjork (2007);

Quiz/experiment results/discuss readings

be strengthened by taking a test? Can I learn incorrect information when taking a test? What role does feedback play in correcting errors during a test?

Butler, Kapricke, & Roediger (2008)

Student Presentation?
Experiment

8: Context Effects - Should I pick one study spot and always study there? What happens if I study and take tests in different places or under very different conditions?

Smith, Glenberg, & Bjork (1978); Eich (1980) Ch. 9 (pp. 182-185)

First Draft Due/In-class Peer Editing
Quiz/experiment results/discuss readings
Student Presentation?
In-class peer editing
Experiment

9: Mnemonic Techniques/Levels of Processing - What other tricks can help me remember things? Can I process information in a more effective way?

Craik & Tulving (1975); deWinstanley & Bjork (2004) Ch. 9 (pp. 176-182) Ch. 14

First Draft Returned

Quiz/experiment results/discuss readings
Student Presentation?
Feedback on first submissions, Designing a follow-up experiment
Experiment

10: Applying Principles of Memory Research to Education - What have I learned about memory? How can I study or teach others more effectively?

Bjork (2001)

(Final Paper Deadline : Friday of 10th Week)

Experiment results/discuss readings
Student Presentation
Trouble-shooting paper problems
Closing
Discussion/Evaluations

All required and optional readings are listed below. Required readings are available in the course reader.

Week 2: Working Memory

Logie, R. H., Zucco, G. M., & Baddeley, A. D. (1990). Interference with visual short-term memory. *Acta Psychologica*, 75, 55-74.

Baddeley, A. D. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Science*, 4, 417-423.

Daneman, M., & Carpenter, P. A. (1980). Individual differences in working memory and reading. *Journal of Verbal Learning and Verbal Behavior*, 19, 450-466.

Optional:

Brooks, L. R. (1968). Spatial and verbal components in the act of recall. *Canadian Journal of Psychology*, 22, 349-368.

Week 3: Interference and Forgetting

McGeoch, J. A. (1932). Forgetting and the law of disuse, *Psychological Review*, 39, 352-370.

Postman, L., & Alper, T. (1946). Retroactive inhibition as a function of the time interpolation of the inhibitor between learning and recall. *American Journal of Psychology*, 59, 439-449.

Underwood, B. J., & Ekstrand, B. R. (1966). An analysis of some shortcomings in the interference theory of forgetting. *Psychological Review*, 73, 540-549.

Schacter, D. (1999). The seven sins of memory: Insights from psychology and cognitive neuroscience. *American Psychologist*, 54, 182-203.

Optional:

Bjork, R. A., LaBerge, D. & Legrand, R. (1968). The modification of short-term memory through instructions to forget. *Psychonomic Science*, 10, 55-56.

Jenkins, J. B., & Dallenbach, K. M. (1924). Oblivescence during sleep and waking. *American Journal of Psychology*, 35, 605-612.

Koriat, A., Bjork, R. A., Sheffer, L., Bar, S. K. (2004). Predicting one's own forgetting: The role of experience-based and theory-based processes. *Journal of Experimental Psychology: General*, 133, 643-656.

Week 4: Spacing Study

- Bjork, R. A., & Allen, T. W. (1970). The spacing effect: consolidation or differential encoding? *Journal of Verbal Learning and Verbal Behavior*, 9, 567-572.
- Cuddy, L. J., & Jacoby, L. L. (1982). When forgetting helps. *Verbal Learning and Verbal Behavior*, 21, 451-467.
- Kornell, N., & Bjork, R. A. (2008). Learning concepts and categories: Is spacing the 'enemy of induction?' *Psychological Science*, 19, 585-592.

Optional:

- Anderson, J. R., & Schooler, L. J. (1991). Reflections of the environment in memory. *Psychological Science*, 2, 396-408.
- Gartman, L. M., & Johnson, N. F. (1972). Massed versus distributed repetition of homographs: A test of the differential-encoding hypothesis. *Journal of Verbal Learning & Verbal Behavior*, 11, 801-808.
- Jacoby, L. L. (1978). On interpreting the effects of repetition: Solving a problem versus remembering a solution. *Journal of Verbal Learning and Verbal Behavior*, 17, 649-667.

Week 5: Retrieval as a Memory Modifier: Testing Effects

- Bjork, R. A. (1988). Retrieval practice and the maintenance of knowledge. In Grunberg, M. M., Morris, P. E., & Sykes, R. N. (Eds.) *Practical aspects of memory: Current research and issues. Vol. 1: Memory in everyday life*. Oxford, England: John Wiley & Sons, 396-401
- Roediger, H. L. & Karpicke, J. D. (2008). The critical importance of retrieval for learning. *Science*, 319, 966-968.
- Richland, L. E., Kornell, N., & Kao, L. S. (2009). The pretesting effect: Do unsuccessful retrieval attempts enhance learning? *Journal of Experimental Psychology: Applied*, 15, 243-257.

Optional:

- Landauer, T. K., & Bjork, R. A. (1978). Optimum rehearsal patterns and name learning In M.M Gruneberg, P.E. Morris, & R.N Sykes (Eds.), *Practical Aspects of Memory*. London: Academic Press, 625-632.

Week 6: Retrieval as a Memory Modifier: Retrieval-Induced Forgetting and Facilitation

- Anderson, M. C., Bjork, R. A., and Bjork, E. L. (1994). Remembering can cause forgetting: Retrieval dynamics in long-term memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20, 1063-1087.
- Macrae, C. N. & MacLeod, M. D. (1999) On recollections lost: When practice makes imperfect. *Journal of Personality and Social Psychology*, 77, 463-473.

Chan, J. C. K., McDermott, K. B., & Roediger, H. L. (2006). Retrieval-induced facilitation: Initially nontested material can benefit from prior testing of related material. *Journal of Experimental Psychology: General*, 135, 553-571.

Optional:

Carroll, M., Campbell-Ratcliffe, J., Murnane, H., & Perfect, T. (2007). Retrieval-induced forgetting in educational contexts: Monitoring, expertise, text integration, and test format. *European Journal of Cognitive Psychology*, 19, 580-606.

Chan, J. C. K. (2009). When does retrieval induce forgetting and when does it induce facilitation? Implications for retrieval inhibition, testing effect, and text processing. *Journal of Memory and Language*, 61, 153-170.

Week 7: Retrieval as a Memory Modifier: Using Multiple-Choice Tests

Marsh, E. J., Roediger, H. L., Bjork, R. A., & Bjork, E. L. (2007). The memorial consequences of multiple-choice testing. *Psychonomic Bulletin & Review*, 14, 194-199.

Butler, A. C., Karpicke, J. D., & Roediger, H. L. (2008). Correcting a metacognitive error: Feedback increases retention of low-confidence correct responses. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 34, 918-928.

Optional:

Butler, A. C., Karpicke, J. D., & Roediger, H. L. (2007). The effect of type and timing of feedback on learning from multiple-choice tests. *Journal of Experimental Psychology: Applied*, 13, 273-281.

Week 8: Context Effects

Smith, S. M., Glenberg, A., & Bjork, R. A. (1978). Environmental context and human memory. *Memory & Cognition*, 6, 342-353.

Eich, J. E. (1980). The cue-dependent nature of state-dependent retrieval. *Memory and Cognition*, 8, 157-173.

Optional:

Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of Psychology*, 66, 325-331.

Smith, S. M. (1979). Remembering in and out of context. *Journal of Experimental Psychology: Human Learning and Memory*, 5, 460-471.

Teasdale, J. D., & Fogarty, S. J. (1979). Differential effects of induced mood on retrieval of pleasant and unpleasant events from episodic memory. *Journal of Abnormal Psychology*, 88, 248-257.

Week 9: Mnemonic Techniques/Levels of Processing

Craik, F. I. M., & Tulving, E. (1975). Depth of processing and retention of words in episodic memory. *Journal of Experimental Psychology: General*, 104, 268-294.

deWinstanley, P. A., & Bjork, E. L. (2004). Processing strategies and the generation effect: Implications for making a better reader. *Memory & Cognition*, 32, 945-955.

Optional:

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning & Verbal Behavior*, 11, 671-684.

Week 10: Applying Principles of Memory Research to Education

Bjork, R. A. (2001). How to succeed in college: Learn how to learn. *APS Observer*